31

CPS-FC210

PART OF CPS FC210

POWER ALARM AND CONTROL CIRCUIT

SHEET INDEX

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21

SYMBOL

CONTROL
ELEMENT IDENT
A

TERM. MOD	FUNCT	TERM.	LOC
AP0ND	I	205	2A5
BP0ND	I	101	2A6
DBP0NI1	I	201	2A2
L0FF1	I	001	2A3
L0FF1G	I	100	2A4
P0FFO	I	203	2A4
P0FFOG	I	303	2AA
DBP0N01	0	102	2G5
0BRLYO	0	002	2G3
PWR0N1	0	301	2G6
PWR0N1G	0	202	2G6

ALARMS
ELEMENT IDENT
B

TERM. MOD	FUNCT	TERM.	LOC
+AA01	I	117	3A2
+AA11	I	215	3A5
+AA21	I	316	3A7
+AB01	I	018	3A2
+AB11	I	315	3A5
+AB21	I	217	3A8
-AAD0	I	116	3A3
-AA10	I	016	3A6
-AA20	I	21D	3A8
CLR00	I	017	3A2
CLR10	I	314	3A5
CLR20	I	216	3A7
0RLY00	0	208	3G1
0RLY10	0	302	3G4
0RLY2D	0	307	3G7
+24A	P	019,11B	3G2
+24B	P	015.114	3G2
+24C	P	218,318	3G2
GRD	G	200,26D	3G2

TEST
ELEMENT IDENT
C

TERM. MOD	FUNCT	TERM.	LOC
NPAI0	I	308	4A3
NPA1	I	003	4A2
0PATR1	I	305	4A5
RNPARI0	I	013	4A4
NPA00	0	012	4G2
0NPAR0	0	211	4G4
0PATR0	0	206	4G5
PAR1	0	113	4G6
RNPAR0D	0	209	4G3

NOTES.

1 ⏚ GROUND RETURN

2. UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS
CAPACITANCE VALUES ARE IN MICROFARADS
VALUES PRECEDED BY THE SYMBOL +(PLUS) OR -(MINUS) ARE IN VOLTS

3. BATTERY AND GROUND TERMINALS FOR INTEGRATED CIRCUITS

IC CODE	BAT TERM.	GRD TERM.
502AJ		3
502BK		3

4 BATTERY AND GROUND TERMINALS FOR THIS CIRCUIT PACK ARE AS FOLLOWS:

FUNCTION	TERMINAL
+24A	019,11B
+24B	015,11A
+24C	218,31B
	06D,200

5. +24D IS INTERNALLY DERIVED FROM +24VA.

6. HORIZONTAL MOUNTING CENTERS AT 1.0 INCH.

DWG ISSUE	EE OR CD ISSUED	DATE ISSUE	DRWN	APPD
1		3-11-74	ASW NCL	RLP MTS RFG
2D1		3-26-74	BTL NCL	RLP MTS RFG
3A		5-7-75	P/S LOD	JJR MTS RFG
4D1		6-23-78	RLN RLN	RAW JOB MG

CURRENT DRAIN

50mA AT +24V

SYSTEM USED ON	DESIGN CONTROL
COMMON SYSTEMS	IN

MANUFACTURING REFERENCES

CATEGORY	NO.	
CIRCUIT PACK CODE	FC21D	
CONNECTOR ON FRAME	947A OR 947C	
SERIES NO. IDENT	~~FOR LATEST CLASS "A" CHANGE~~	
	ACCEPTABLE SERIES	2

SHEET INDEX NOTES

1. WHEN CHANGES ARE MADE IN THIS DRAWING ONLY THOSE SHEETS AFFECTED WILL BE REISSUED.
2. THIS SHEET INDEX WILL BE REISSUED AND BROUGHT UP TO DATE EACH TIME ANY SHEET OF THE DRAWING IS REISSUED, OR A NEW SHEET IS ADDED.
3. THE ISSUE NUMBER ASSIGNED TO A CHANGED OR NEW SHEET WILL BE THE SAME ISSUE NUMBER AS THAT OF THE FIRST SHEET.
4. SHEETS THAT ARE NOT CHANGED WILL RETAIN THEIR EXISTING ISSUE NUMBER.
5. THE LAST ISSUE NUMBER OF THE FIRST SHEET INDEX IS RECOGNIZED AS THE LATEST ISSUE NUMBER OF THE DRAWING AS A WHOLE

NOTICE- NOT FOR USE OR DISCLOSURE OUTSIDE THE BELL SYSTEM EXCEPT UNDER WRITTEN AGREEMENT.

ISSUE
4D1

1N9B

FC210 CIRCUIT PACK

POWER ALARM AND CONTROL
CIRCUIT

②

AT&TCO
STANDARD

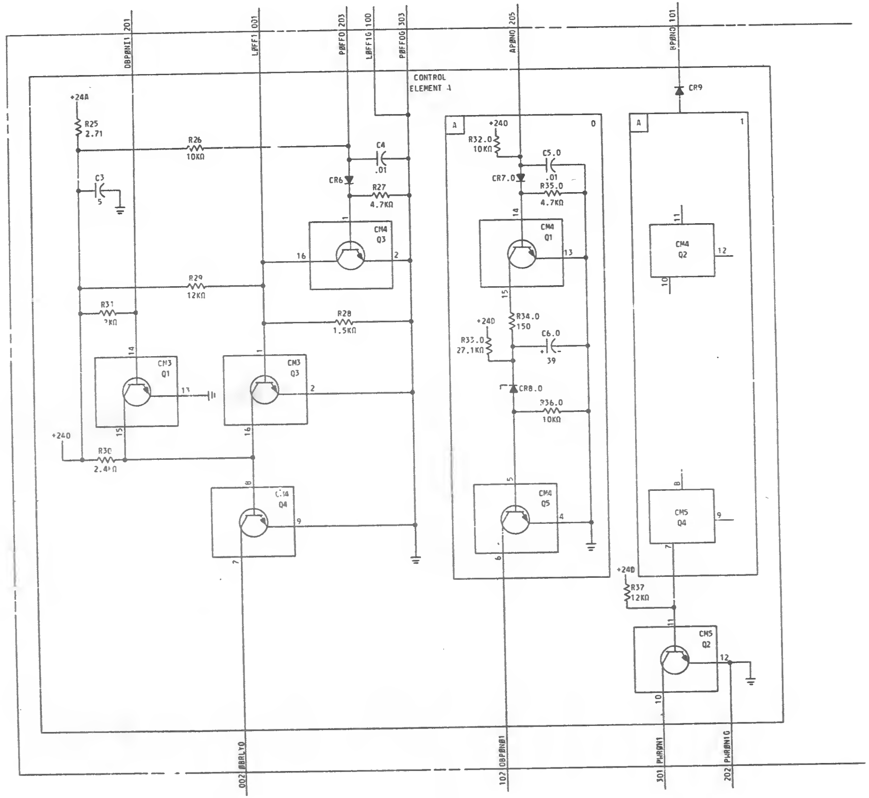
CPS-FC210
5 SHEETS

BELL TELEPHONE LABORATORIES
INCORPORATED

6S

CPS-FC210

PART OF CPS FC210
POWER ALARM AND CONTROL CIRCUIT



FC210 CIRCUIT PACK
②
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CPS-FC210
SHEET 2
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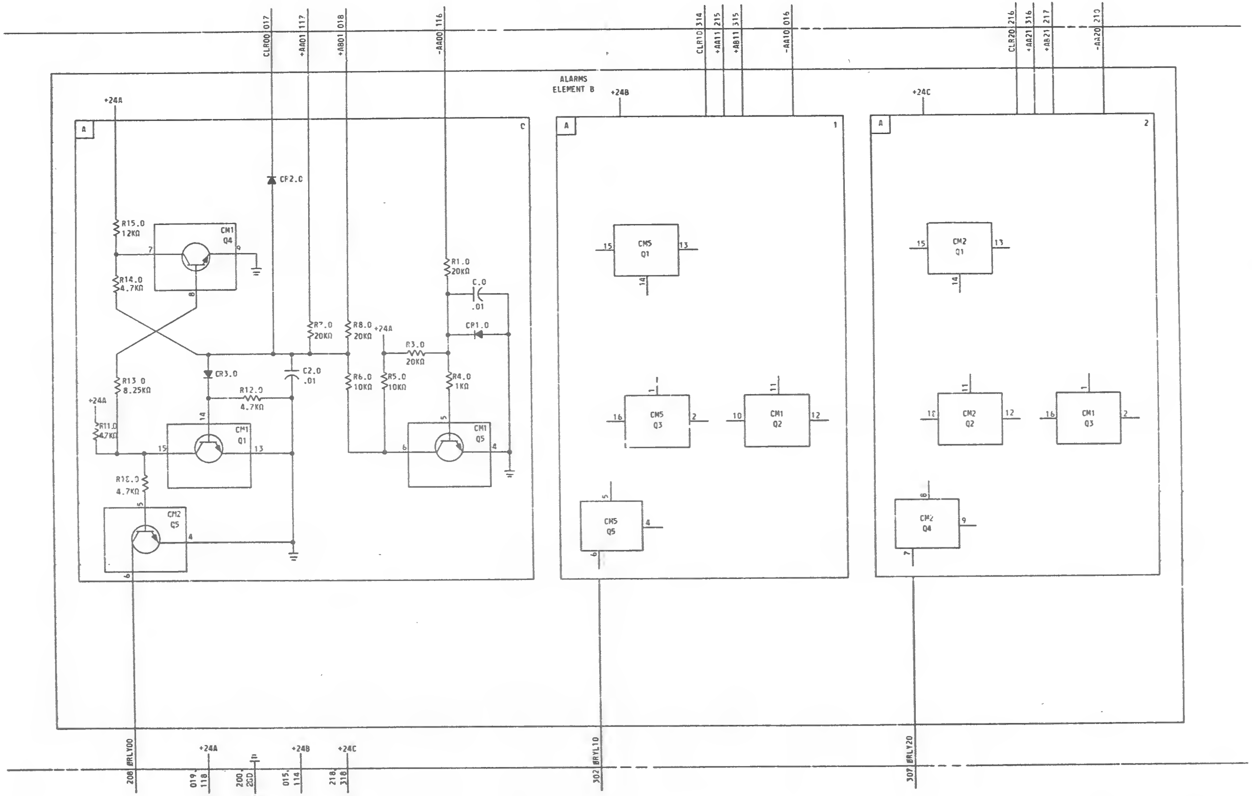
ISSUE
3A

CPS-FC210

PART OF CPS FC210

POWER ALARM AND CONTROL CIRCUIT



CPS-FC210

ISSUE 3A

FC210 CIRCUIT PACK ②

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CPS-FC210
SHEET 3

COMPONENT LIST

CAPACITOR

	DESIG	CODE
[3]	C1.0-C1.2	KS-19774 L1,.01
[3]	C2.0-C2.2	KS-19774 L1,.01
	C3	601A,5
	C4	KS-19774 L1,.01
[2]	C5.0,C5.1	KS-19774 L1,.01
[2]	C6.0,C6.1	614C, 39

DIODE

	DESIG	CODE
[3]	CR1.0-CR1.2	458A
[3]	CR2.0-CR2.2	458A
[3]	CR3.0-CR3.2	458A
[3]	CR4-CR6	449A
[2]	CR7.0,CR7.1	449A
[2]	CR8.0,CR8.1	459J
	CR9	458A

INTEGRATED CIRCUIT

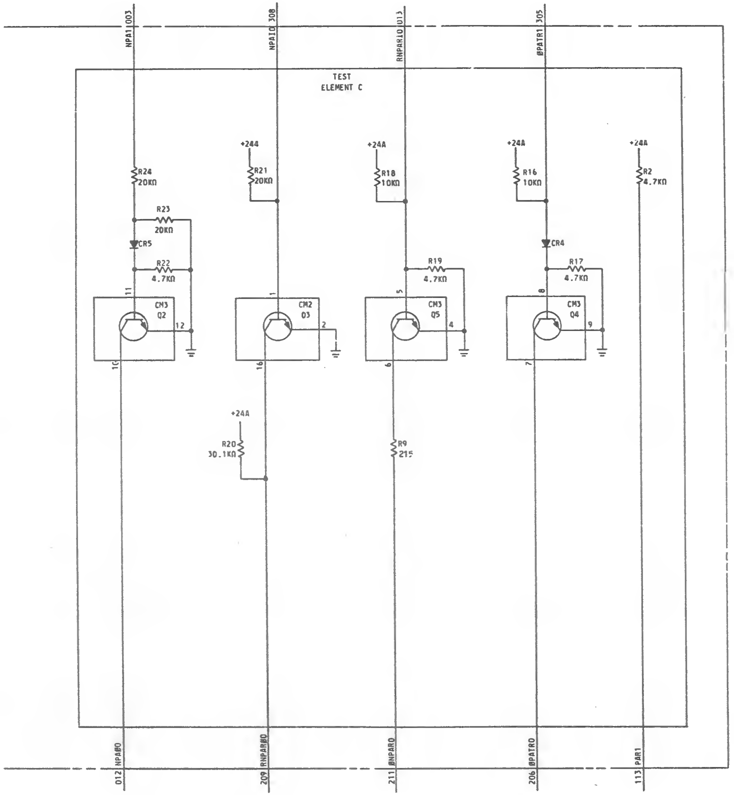
	DESIG	CODE
	CM1	502AJ
[4]	CM2-CM5	502BK

RESISTOR

	DESIG	CODE
[3]	R1.0-R1.2	257A, 20KΩ
	R2	KS-20616, L1A,4.7KΩ
[3]	R3.0-R3.2	257A,20KΩ
[3]	R4.0-R4.2	1KΩ
[3]	R5.0-R5.2	10KΩ
[3]	R6.0-R6.2	10KΩ
[3]	R7.0-R7.2	20KΩ
[3]	R8.0-R8.2	257A,20KΩ
	R9	KS-14603 L3A, 215
[3]	R10.0-R10.2	257A,4.7KΩ
[3]	R11.0-R11.2	KS-20616, L1A,4.7KΩ
[3]	R12.0-R12.2	257A,4.7KΩ
[3]	R13.0-R13.2	8.25KΩ
[3]	R14.0-R14.2	4.7KΩ
[3]	R15.0-R15.2	12KΩ
	R16	10KΩ
	R17	4.7KΩ
	R18	10KΩ
	R19	4.7KΩ
	R20	30.1KΩ
	R21	20KΩ
	R22	4.7KΩ
	R23	20KΩ
	R24	257A,20KΩ
	R25	KS-20616, L1A 2.71
	R26	257A,10KΩ
	R27	4.7KΩ
	R28	1,5KΩ
	R29	257A,12KΩ
	R30	KS-19150 L1,2.4KΩ
	R31	257A,12KΩ
[2]	R32.0,R32.1	10KΩ
[2]	R33.0,R33.1	27.1KΩ
[2]	R34.0,R34.1	150
[2]	R35.0,R35.1	4.7KΩ
[2]	R36.0,R36.1	10KΩ
	R37	257A,12KΩ

PART OF CPS FC210

POWER 4LARM AND CONTROL CIRCUIT



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FC210 CIRCUIT PACK

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SHEET 4

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PART OF CPS FC210

CIRCUIT DESCRIPTION

CIRCUIT DESCRIPTION

A. FUNCTION

THE FC210 CIRCUIT PACK CONTAINS LOGIC AND TIMING CIRCUITS USED TO CONTROL, TEST AND ALARM POWER IN THE MAINTENANCE AND PROCESSOR FRAMES.

B. DETAILED DESCRIPTION

LEADS WITH MNEMONICS THAT END IN 1 ARE GENERALLY HIGH WHEN ACTIVE OR IN THE ONE STATE. THOSE THAT END IN 0 ARE GENERALLY LOW WHEN ACTIVE OR IN THE ONE STATE.

CONTROL - ELEMENT A

OUTPUT ØBRLYO CAN SINK UP TO 50 MILLIAMPERES FROM A SOURCE LESS THAN 30 VOLTS. IT IS CONTROLLED BY INPUTS DBPØNI1, LØFF1 AND PØFFD IN ACCORDANCE WITH THE FOLLOWING TABLE:

TABLE A

DBPØNI1	LØFF1	PØFFO	ØBRLYO
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

VOLTAGE DIVIDER R29 AND R28 LIMITS THE POTENTIAL AT LØFF1 TO LESS THAN 3 VOLTS IN THE EVENT THAT 03 OF CM3 FAILS IN ORDER TO PROTECT THE [illegible] LOGIC GATE THAT DRIVES LØFF1. C4,CR6, AND R27 PROVIDE NOISE IMMUNITY ON THE PØFFO INPUT. LØFF1G AND PØFF1G ARE TERMINATIONS FOR GROUND LEADS PAIRED WITH LØFF1 AND PØFF1 TO ALLOW THE SOURCE FOR THESE SIGNAL LEADS TO BE IN A DIFFERENT UNIT FROM THE FC210 CIRCUIT PACK.

DPBØNØ1 IS CONTROLLED BY APØNO THROUGH A DELAY CIRCUIT. WHEN APØNO IS OPEN, R32.0 TURNS ON Q1 OF CM4 WHICH CUTS OFF Q5 OF CM4 AND ALLOWS DBPØNØ1 TO GO HIGH. DBPØNØ1 CAN SINK 2.5 MILLIAMPERES FROM A 30-VOLT SOURCE. WHEN APØNO IS GROUNDED Q1 CUTS OFF AND C6.0 CHARGES TO +24 VOLTS THROUGH R33.0. WHEN C6.0 HAS CHARGED TO APPROXIMATELY 12.8 VOLTS, CR8.0 TURNS ON Q5 AND OBPØNØ1 FALLS TO GROUND. THE DELAY BETWEEN THE CHANGE IN APØND AND DPBØNØ1 IN THIS DIRECTION IS NOMINALLY 800 MILLISECONDS,BUT WITH CIRCUIT TOLERANCES, IT CAN RANGE BETWEEN 500 MILLISECONDS AND 2 SECONDS. DPBØNØ1 IMMEDIATELY FOLLOWS APØNO WHEN THE LATTER GOES OPEN.

PWRØN1 IS CONTROLLED BY BPØNO IN THE SAME MANNER DESCRIBED FOR DBPØNO1 AND APØNO EXCEPT THAT AN INVERTER, Q5 OF CM2, CAUSES PWRØN1 TO BE LOW WHEN BPØNO IS HIGH AND VICE VERSA.

THE DIODE INPUT FROM BPØNO TO THE DELAY CIRCUIT PROVIDES ISOLATION SO THE SOURCE THAT CONTROLS BPØNO CAN CONTROL ANOTHER CIRCUIT. PWRØN1G PROVIDES A GROUND CONNECTION FOR A LEAD PAIRED WITH THE PWRØN1 SIGNAL LEAD WHEN IT IS SENT TO A REMOTE CIRCUIT.

ALARMS - ELEMENT B

THREE IDENTICAL CIRCUITS DESIGNATED 0, 1 AND 2 ARE PROVIDED TO MONITOR THE FRAME FUSE ALARM AND POWER ALARM BUSES. THE FOLLOWING DESCRIPTION FOR CIRCUIT 0 IS APPLICABLE TO CIRCUITS 1 AND 2. Q1 AND Q4 OF CM1 FORM A FLIP-FLOP TO LATCH THE ALARM SIGNALS. INPUTS +AAG1,+AB01, AND -AA00 ARE OPEN IN THE ABSENCE OF AN ALARM. THE FLIP-FLOP IS INITIALIZED BY GROUNDING CLR00, WHICH CUTS OFF Q1 BY DIVERTING ITS BASE CURRENT TO GROUND THROUGH CR2.0. Q2 SATURATES AND HOLDS D1 OFF WHEN THE CLR0 SIGNAL IS REMOVED. IN THIS STATE, Q5 OF CM1 CAN SINK 30 MILLIAMPERES FROM A SOURCE LESS THAN 30 VOLTS. INPUTS +AA01 AND +ABG1 CONNECT TO ALARM BUSES THAT ARE AT +20 VOLTS IN THE ALARM STATE. EITHER INPUT IN THIS STATE SETS THE FLIP-FLOP CAUSING Q5 OF CM2 TO CUT OFF. INPUT -AA00 CONNECTS TO THE FRAME NEGATIVE FUSE ALARM BUS. IN THE ALARM CONDITION, A NEGATIVE POTENTIAL IS PRESENT ON THIS BUS. Q5 OF CM1 CUTS OFF IN THIS CONDITION AND SETS THE FLIP-FLOP VIA R5 AND R6.

C2.0, CR3.0 AND R12.0 SET THE INPUT LEVEL OF THE FLIP-FLOPS AND PROVIDE FILTERING SO THAT NOISE SPIKES WILL NOT ERRONEOUSLY CHANGE THE STATE OF THE FLIP-FLOP.

TEST - ELEMENT C

FOUR INVERTERS USED IN THE FRAME POWER ALARM TEST ARE PROVIDED. 04 AND Q5 OF CM3 CONTROL THE NPA AND PAT RELAYS OF THE POWER UNIT. CR4 AND CR5 RAISE THE THRESHOLD OF THEIR RESPECTIVE INPUTS TO PROVIDE NOISE PROTECTION. PAR1 SUPPLIES A 24-VOLT SIGNAL FOR THE POWER ALARM TEST FUNCTION.

C. SYMBOL/LEAD MNEMONICS

DESIGNATION	MEANING
APØND	"A" POWER ON SIGNAL
+AA01,+AA11,+AA21 +AB01,+AB11,+AB21	POSITIVE FUSE ALARM INPUTS
-AA0C,-AA10,-AA20	NEGATIVE FUSE ALARM INPUTS
BPØNO	"B" POWER ON SIGNAL
CLR00,CLR10,CLR20	CLEAR ALARM FLIP-FLOP 0,1 AND 2
DBPØNI1	DELAY "B" POWER ON, INPUT SIGNAL
DBPØNØ1	DELAY "B" POWER ON, OUTPUT SIGNAL
LØFF1/LØFF1G	LOCKED OFF LINE SIGNAL/GROUND
NPAI0	NPA INVERTED INPUT SIGNAL
NPAØ0	NPA INVERTED OUTPUT SIGNAL
NPA1	NPA NET CONNECTION
ØBRLYO	OPERATE "B" RELAYS
ØNPARO	OPERATE NPA RELAY
ØPATRO	OPERATE PAT RELAY
ØPATR1	OPERATE PAT RELAY
PAR1	POWER ALARM TEST SIGNAL
PØFFO/PØFFOG	POWER OFF SIGNAL/GROUND
PWRØN1/PWRØN1G	POWER ON SIGNAL/GROUND
RNPARI0	RELEASE NPA RELAY

ISSUE 3A

FC210 CIRCUIT PACK

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SHEET 5